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10 FEBRUARY 1987

USSR Report

CHEMISTRY



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ADSORPTION

UDC 661:42.2:185.5:66.018

CHEMICAL STABILITY OF TITANIUM PHOSPHATE ADSORBENTS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 7, Jul 86
(manuscript received 19 Dec 84) pp 1440-1443

[Article by T. Ye. Mitchenko, V. N. Belyakov, A. M. Roytenberg and L. Ye. Postolov]

[Abstract] Several methods were employed to assess the chemical stability of titanium phosphate (TP) ion-exchangers, using exposures of TP to various reagents and pH modification as the chief criteria. The resultant studies demonstrated that TP was useful within a broad pH 1-7 range, which could be extended to pH 10 in the case of highly-mineralized solutions. Granular TP was capable of sustaining at least five adsorption-desorption cycles without appreciable alterations in surface area or adsorptive characteristics. In addition, since regeneration of TP involves 1-2 N mineral acids, further determinations were conducted which demonstrated that TP was most stable in 2 N sulfuric acid, moderately stable in 2 N hydrochloric acid and least stable in 2 N nitric acid. References 8: 7 Russian, 1 Western.

12172/12947
CSO: 1841/9

UDC 669.213.3

ADSORPTION OF Au(I) AND Ag(I) FROM ACIDIC THIOUREA SOLUTIONS BY PSb AND SiPSb CATION EXCHANGERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 7, Jul 86
(manuscript received 29 Aug 85) pp 1473-1477

[Article by O. V. Ovchinnikova, A. S. Chernyak, L. L. Zavyalova, F. A. Belinskaya, E. A. Miliitsina and N. S. Grigorova]

[Abstract] PSb and SiPSb cation exchangers were evaluated for their efficiency in the recovery of Au(I) and Ag(I) from acidic thiourea solutions. Recovery data demonstrated that the presence of Si enhanced the efficiency of recovery from the 0.05 M thiourea solutions acidified with 0.1 M HCl, in which Au(I) and Ag(I) exist as thiourea complexes. Both agents were more efficient in the extraction of Ag than Au, with the capacity for Au improving from 24.4 to 51.9 mg/g in going from PSb to SiPSb-8. PSb and SiPSb were also effective in the recovery of all cations in the copper subgroup in mixed solutions, and in the selective recovery of Ag from such mixtures. Figures 5; references 8 (Russian).

12172/12947
CSO: 1841/9

ANALYTICAL CHEMISTRY

UDC 542.943.7:542.61:546.8:541.49

OXIDATION OF SELECTED CORROSION-RESISTANT METALS IN HF-DMFA SYSTEM

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKAYA in Russian No 8,
Aug 86 (manuscript received 2 Oct 85) pp 1896-1898

[Article by A. K. Chulkevich, Ye. V. Smolina, I. P. Lavrentyev and M. L. Khidekel, Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka]

[Abstract] Oxidative dissolution of transition metals in organic and aqueous organic solvents has been used to obtain a variety of complex compounds. This approach was used in the present study, employing oxidation of Ti, Zr, Nb, Ta, Cr and Mn in HF-DMFA and HF-DMFA-H₂O₂ systems. Ti, Zr, Cr and Mn were readily oxidized in the HF-DMFA system, while Nb and Ta required the system with H₂O₂. IR spectroscopy demonstrated that dimethylammonium oxyfluorides were formed with Ti, Zr, Nb and Ta, while Cr and Mn yielded oxyflourides without coordination of the solvent molecules. References 7: 5 Russian, 2 Western.

12172/12947
CSO: 1841/6

UDC 543.062:546.59

POTENTIAL-CONTROLLED COULOMBETRIC DETERMINATION OF GOLD IN PALLADIUM AND
COPPER CONTAINING JEWELRY ALLOY

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHMICHESKAYA in Russian
No 4, Jul-Aug 86 (manuscript received 9 Sep 85) pp 465-467

[Article by S. S. Chernaya, B. P. Matseyevskiy, Ye. V. Fioshin and N. S.
Ivanova, Riga Polytechnic Institute imeni A. Ya. Pelshe]

[Abstract] Description is provided of a potential-controlled coulombmetric determination of gold in HCl solutions of jewelry alloy containing palladium and copper. The coulombmeter [Chernaya, S. S., et al., Izv. AN Latv.SSR: Ser. Khim., No 2: 217-221, 1986], operated in voltage-regulated mode, yielded analytical results with a reproducibility of better than 0.1%. Optimal conditions for gold analysis consisted of a cathode potential of 0.5 V, a cathode area of 24 cm^2 , 0.5 M HCl, and a concentration of gold in the 5.6 to 6.4 range. The time required for an analysis was 32 min. References 4 (Russian).

12172/12947
CSO: 1841/12

CATALYSIS

UDC 546.881'32'22-21

REACTION OF ACTIVE COMPONENT OF VANADIUM-SULFUR CATALYSTS WITH WATER VAPOR

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 59, No 7, Jul 86
(manuscript received 9 Apr 85) pp 1463-1468

[Article by V.N. Krasilnikov, A. A. Ivakin, L. N. Manayeva and V. I. Malkiman,
Institute of Chemistry, Urals Scientific Center, USSR Academy of Sciences;
Urals Scientific Research Chemical Institute]

[Abstract] Extensive analytical studies were conducted on vanadium-sulfur catalysts to determine the effects of moisture on the active component. The combination of x-ray phase analysis, chemical analysis, as well as ESR and IR spectroscopies provided proof for hydration at room temperature, that led to pronounced changes in the active component of the catalyst and resultant loss of catalytic efficiency. These findings, also, were in accord with the view that the active component of the catalytic system can best be described as falling into the following system: $K_2O-V_{25}^{2+}-V_{24}^{4+}-SO_3-H_2O$. Figures 3; references 11 (Russian).

12172/12947
CSO: 1841/9

UDC 546.623:546.273

MECHANICAL STABILITY OF CATALYSTS FOR NATURAL GAS CONVERSION WITH WATER VAPORS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 7, Jul 86
(manuscript received 12 Feb 85) pp 1469-1472

[Article by N. V. Kochetkova, T. A. Anufriyeva, V. N. Anokhin, V. A. Peregudov and Ye. A. Titova]

[Abstract] A comparative study was conducted on the effects of introduction of chromium oxide into the nickel-boron-aluminum oxide catalyst used for methane conversion on the mechanical stability and composition. Analysis of the effects of air and argon calcining on the phase composition of the catalysts demonstrated that addition of boron and chromium oxides favors spinel formation and inactivation of the catalytic system. The increase in the binding of nickel oxide in the nickel-boron-aluminum oxide catalyst on 600-700°C calcining was ascribed to the formation of $\text{Ni}_3\text{B}_2\text{O}_6$, as well as aluminum-nickel spinel structures. $\text{Ni}_3\text{B}_2\text{O}_6$ was unstable in water vapor calcining, resulting in a decrease in boron oxide and an increase in the nickel oxide component. Figures 1; references 7 (Russian).

12172/12947
CSO: 1841/9

UDC 542.95:543.51:547.898

SYNTHESIS OF MONO- AND DIACYLBENZO-12-CROWN-4-ETHERS

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 59, No 7, Jul 86
(manuscript received 7 Mar 85) pp 1627-1628

[Article by T. I. Zhukova, K. A. Vyunov and L. R. Davydenkov, Leningrad Technologic Institute imeni Lensoveta [Leningrad Soviet]]

[Abstract] The Friedl-Crafts reaction was employed for the acylation of benzo-12-crown-4-ether with acetic, propionic, butyric or pentanoic acid in the preparation of the mono- and diacyl-derivatives, using polyphosphoric acid for condensation. The monoacyl-congeners were synthesized by the use of 1:2 cyclopolyether:carboxylic acid ratio, while synthesis of the diacyl analogs required a 1:4 ratio of the reactants. The acylated products showed improved solubility in water while retaining full efficiency in lithium ion extraction. In addition to their potential use in studies on ionic permeability of biological membranes, such compounds may have therapeutic applications in regulating lithium metabolism in view of their low toxicity. References 6: 3 Russian, 3 Western.

12172/12947
CSO: 1841/9

UDC 547.212:542.943:542.973

PREPARATION AND CATALYTIC ACTIVITY OF METAL MOLYBDATES IN OXIDATIVE DEHYDROGENATION OF n-BUTANE

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 52, No 9, Sep 86
(manuscript received 17 Jan 85) pp 927-930

[Article by V. A. Doroshenko and L. P. Shapovalova, Department of Oil Chemistry, Institute of Physicoorganic Chemistry and Carbon Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Coprecipitation was employed as a method for the preparation of metal molybdates from solutions of metal nitrates and ammonium p-molybdate. Physical methods indicated that the process involved several stages with the release of water, ammonia and nitrogen oxides. Assessment of catalytic activity in oxidative dehydrogenation of n-butane was conducted at 600°C, with the partial pressure of oxygen varied from 0.9 to 15.6 kPa. The rate of n-butane conversion was highest on Mn and Fe molybdates, and lowest on Mg molybdate. A reduction in the partial pressure of oxygen led to a decrease in the rate of conversion of n-butane into butadiene with, however, an increase in selectivity. The latter was most pronounced in the case of Mg and Co molybdates: a decrease in the partial pressure from 15.6 to 0.9 kPa improved selectivity from 4 to 51% on Mg molybdate, and from 2 to 43% on the co catalyst. Improvements in selectivity were minimal with the Mn and fe catalysts. Figures 2; references 7: 6 Russian, 1 Western.

12172/12947
CSO: 1841/11

UDC 541.183:541.128

ADSORPTIVE AND CATALYTIC PROPERTIES OF MODIFIED CARBON FIBROUS MATERIALS

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 52, No 9, Sep 86
(manuscript received 28 Feb 85) pp 946-950

[Article by S. S. Stavitskaya, I. R. Kuznetsova and I. A. Tarkovskaya,
Institute of Physical Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A brief summary is presented of the results obtained in studies on activated carbon fibrous material derived from graphitized viscose. Analysis of the adsorptive characteristics and catalytic activities in a number of model redox and protolytic reactions of 'native' and modified carbon materials demonstrated essentially no differences with the behavior of known carbon samples. These observations indicated that graphitized viscose may be a useful source of fibrous carbon materials with selective adsorptive and catalytic characteristics. Figures 1; tables 3; references 10 (Russian).

12172/12947
CSO: 1841/11

CHEMICAL INDUSTRY

MINISTERIAL COORDINATION OF INTEGRATION OF CHEMISTRY INTO NATIONAL ECONOMY

Moscow IZVESTIYA in Russian 26 May 86 p 2

[Interview of Ya. P. Ryabov, deputy chairman of the USSR Council of Ministers, by B. Konovalov, IZVESTIYA scientific columnist: "Chemistry and Progress"]

[Text] [Question] Yakov Petrovich, recently we adopted the Integrated Program of Chemization of the Economy of the USSR for the Period Up to the Year 2000. What role should it play in accelerating scientific and technical progress and in the sharp boost in the economy plant by the 27th CPSU Congress?

[Answer] Goods produced by the chemical industry permeate, figuratively speaking, the entire "organism" of the economy. Without accelerated development of chemistry, it would be practically impossible to reach advanced levels of labor productivity, economizing on resources, and improving the characteristics of the goods of machine building and the latest fields of technology.

Chemistry should be the foundation for accelerating the development of virtually all sectors of the economy and improving consumer service to the population. Therefore, substantial growth is planned for the chemical industry. Within 15 years, the production of plastics will be increased by a factor of 2.5, chemical fibers by a factor of 2, mineral fertilizers by a factor of 1.7, synthetic detergents by a factor of 1.6, and plastic tubes by a factor of 4.5. The output of other chemical goods will be increased just as sharply, beginning even in this 5-year period.

The program of chemization will be implemented mainly through technical reoutfitting of production, using advanced techniques without increasing the total number of people employed in the chemical sector. It is proposed that labor productivity be increased by a factor of 2.3-2.5. At the same time we faced the task of reducing the number of workers engaged in manual labor by a factor of 4-4.5.

As a whole, the economic effect in the national economy of realizing the program of chemization will amount to more than 450 billion rubles in 15 years. The volume of production of chemical goods will be increased up to a percent of the total volume of industrial production.

[Question] There is an expression: Small, but precious. We have hundreds of substances and materials which the country's economy needs in small quantities, but they are not being produced. When will this situation change--when will low-tonnage chemistry get more attention?

[Answer] Low-tonnage chemistry has not been forgotten. The selection of these substances currently being produced by the industry comes to more than 13,000 of the 50,000 different products of our chemical industry.

The program of chemization calls for expanding this selection still further and increasing the scale of production of low-tonnage products necessary for accelerating scientific and technical progress and increasing the quality of products in many sectors of the economy. For example, the selection of ultra-pure substances currently being produced will be doubled, including those used in microelectronics and fiber optics, the development of which is connected with the revolutionary transformations in communications technology.

It is planned to create an information and research center on low-tonnage chemistry in the Niopik Scientific Production Association in Moscow. Plans also call for developing a goal-oriented program to create and adopt flexible automatic systems for newly designed and reconstructed low-tonnage production facilities, which would make it possible to easily switch over from producing one chemical product to another one and provide a wide selection.

The CPSU Central Committee and USSR Council of Ministers entrusted the Ministry of Chemical Industry and USSR State Planning Committee with preparing a draft of a decree on developing the production of low-tonnage chemical goods. Currently this work is in the completion stage.

[Question] Chemical science is called upon to ensure the development of domestic industry at a very advanced level. In number of chemical workers we are not inferior to foreign countries, but we frequently buy foreign technologies. Why does this happen? Isn't it time to restructure our principles of organizing chemical science? Many scientists believe that the system of head institutes, which turn into uncontrolled monopolies, is defective. Is it perhaps time to switch to a competitive basis for creating designs of major chemical production facilities?

[Answer] The need to restructure the organization of scientific research has become acute, and not only in the field of chemistry--this situation is common to the entire country. After the June 1985 meeting of the CPSU Central Committee on Accelerating Scientific and Technical Progress, active work has been going on in this direction. Priority development is now being given to scientific-production associations which include scientific establishments, an experimental base, a project-design section, and startup subdivisions. Through better "meshing" of individual stages of work, elimination of superfluous links, and centralization of direction alone, the time from carrying out the basic research to adopting new developments has been reduced by a factor of 1.3-1.6 in leading scientific-production associations. It is also quite significant that scientific-production organizations pass along the techniques they develop to other enterprises "on the go," as it is described.

The work to create new scientific-production associations will be continued in 1986-1987, and when it is finished more than 70 percent of the scientific workers and investments directed into science will be concentrated in such places.

It is now becoming very important to strengthen the ties between industry and sectorial, academic, and VUZ science. Interbranch scientific technical complexes are now being created in the most important mainline directions. The interbranch scientific technical complexes "Membranes" and "Catalysts" have already been created, which should play a vast role in the development of new, advanced technologies. It is sufficient to say that 80-85 percent of all technological processes in chemistry are currently carried out with the help of catalysts. And increasing the attention given to this somewhat "narrow" field will have a beneficial effect on the development of all of our chemistry and raise the level and relevance of new developments.

This is vitally important for us. During the last 5-year period approximately 40 percent of the new developments adopted by the Ministry of Chemical Industry were inferior to the best samples worldwide. We must not put up with this.

To understand and make use of foreign experience, of course, is useful, since this makes it possible to accelerate our development without "reinventing the wheel." It is also quite significant that as a rule, along with new technology, we also purchase modern equipment which our machine-building sector is not yet producing. Unfortunately, the proportion of equipment which has been in use less than 5 years in our chemical industry is being reduced. Conversely, the proportion of equipment which is over 10 years old is growing steadily. The Ministry of Chemical and Petroleum Machine Building faces the truly titanic task of breaking up the situation which has developed and providing domestic chemistry with the latest equipment, while the Ministry of Instrument Making, Automation Equipment, and control systems must provide integrated systems of automation for processes and production.

We know very well that we must not place the development of Soviet chemistry in a state of too much dependence on the capitalist countries, and we are trying to reduce our purchases there. According to expert estimates, even in the 11th Five-Year Plan purchases of equipment in the capitalist countries were substantially reduced.

At the same time, collaboration with the socialist countries is being expanded in every possible way, scientific-technical and production cooperation are being increased, direct connections are being strengthened, and joint scientific production associations and enterprises are being planned.

The Integrated Program of Scientific and Technical Progress of CEMA Member Countries Up to the Year 2000 has planned an international division of labor and priority directions of cooperation for the fraternal countries. Realization of these joint plans will have great significance for accelerating the development of the economy of our country. Thus, for example, in the "Biotechnology" direction, the USSR, Czechoslovakia, Hungary, and the GDR will combine forces to create approximately 300 different regions which will ensure

a higher scientific level and reduced time spent on research in the field of genetic engineering, biology, and biochemistry. In the "Electronicization of the Economy" direction, the techniques and equipment will be worked out which are necessary for the production of 20 ultrapure substances for microelectronics.

As for competitive plans, that is a necessary effort, because it promotes an increased technological level of the production facilities being created and improved indicators for them the most rapidly of all. At the same time, I would like to emphasize that in principle no one prohibits drawing up plans on a competitive basis. It is just that the USSR State Planning Committee and Ministries are too timid in adopting this method in practice. It should be noted that a number of totally unnecessary obstacles have been placed in the path of competitive plans. And meanwhile a decree by the USSR Council of Ministers concerning improvement of budget planning has given the USSR State Committee for Construction and Ministries the right to draw up model plans, as a rule on a competitive basis.

[Question] Unfortunately, we have unacceptably slow rates of adopting scientific achievements. For example, in the Norplast Scientific Production Association, which was especially created to fill polymers with inexpensive raw materials of the chalk type, and also to insert "additives" at the polymerization stage, 5 years after its organization, new projects occupy only 1 percent of the total volume of work done. When the press criticizes this state of affairs, the Ministry of Chemical Industry brings Norplast under its defense, although it knows even better than others that the country does not have enough polymer materials. The Ministry of Chemical Industry is also displaying baffling slowness in creating a production facility for radiation-modified materials. The use of industrial accelerators by the USSR Academy of Sciences Siberian Department Institute of Nuclear Physics sharply improves the properties of materials when they are irradiated with an electronic beam. The USSR State Planning Committee decided in 1985 to reconstruct the Novosibirsk Chemical Plant in order to organize radiation technologies, but the Ministry of Chemical Industry is essentially putting the brakes on this. A multitude of such examples could be cited. What measures are being planned to get away from such instances, and put valuable new developments into circulation and produce advanced materials as rapidly as possible?

[Answer] IZVESTIYA was absolutely correct in criticizing the Ministry of Chemical Industry for its slow rate of organizing the filling of polymers with inexpensive inorganic materials. The situation created in the Norplast Scientific Production Association was examined at a session of the USSR Council of Ministers. Unfortunately, the government's decisions to create and organize this association are not being fulfilled in a satisfactory manner. The construction of an experimental-industrial production facility for filled polyethylene is being held up. The creation in the city of Mytishchi of an experimental installation to produce polyethylene filled with perlite and heat insulating materials based on it has dragged on and on. The reconstruction deadlines of Kuskovsk Chemical Plant have been disrupted.

Now the USSR State Planning Committee, Ministry of Chemical Industry, RSFSR Council of Ministers, Moscow City Ispolkom, and other departments have each been given their corresponding assignments. Plans call for creating an experimental-industrial production facility for filled polyethylene in Kazakhstan

at the Guryev Chemical Plant. The Kuskovsk Chemical Plant is to be turned into an experimental-operational subdivision of Norplast Scientific Production Association.

In the future we intend to examine the question of turning Novosibirsk Chemical Plant into a center for producing radiation-modified materials.

On the whole, it must be said that it is now necessary to make a radical change in the work of chemical science in order to fulfill the program of chemization. Measures are already being taken. Recently the board of directors of the USSR State Committee for Science and Technology examined the activities of the scientific organizations of the Ministry of Chemical Industry, and the state of affairs was analyzed in detail and radical reorganization planned.

The Ministry of Chemical Industry should conduct a special economic experiment directed at raising the technical level of newly created technological processes for producing materials and chemical products, as well as those already existing in the industry and also directed toward increasing financial interest in creating new technology and accelerating the process of adopting scientific achievements.

Plans call for implementing a set of organizational and economic measures directed at establishing a rating of the activity of production, planning, and scientific organizations, a wages fund, and funds for providing incentives, all based strictly on the achievement of high indicators in industry.

This should be carried out at rapid speeds as early as during this 5-year period. Soviet chemists face the difficult task of obtaining an economic effect of 4.5 billion rubles within 5 years by adopting the new developments of scientific organizations.

By the end of the 5-year period, the quantity of new developments whose technical and economic indicators are higher than or equal to the best foreign analogues should be brought up to 90 percent. The times required to adopt new technology should be reduced by a factor of 1.3-2.

In conclusion, I would like to note that many of the current difficulties were engendered by departmental barriers and poor guidance on the part of ministries. But the party and government are carrying out a great deal of work to improve the system of directing the sectors of the economy. The State Agro-industrial Committee has been created, along with two bureaus of the USSR Council of Ministers—one for machine building and one for the fuel-energy complex. Analogous decisions are being prepared for sectors of heavy industry as well. This will make it possible for us to make comprehensive use of the mineral wealth of our country, and effectively resolve the problems which arise at the "interfaces" of various ministries.

12255/12947
CSO: 1841/572

PROGRESS IN CHEMICAL SECTOR

Moscow IZVESTIYA in Russian 9 Jun 86 p 2

[Article by IZVESTIYA Special Correspondent V. Sukhachevskiy: "Chemistry and the Five-Year Period"]

[Text] How is fulfillment of the program of chemization of the economy progressing, what has been accomplished, and what levels should be reached in the 12th Five-Year Plan? These important issues of the Soviet economy were examined in detail at a meeting of the preparatory commission for the chemical-wood complex, formed by the standing commissions of the chambers of the USSR Supreme Soviet. Reports and information were presented by the following people: A. Lukachov, deputy chairman of the USSR State Planning Committee, D. Kondakov, deputy chief of the Department of Petroleum and Gas Industry of the USSR State Planning Committee, V. Novoseltsev, chief of the Department of Chemistry of the USSR State Committee for Science and Technology, V. Listov, minister of the chemical industry, N. Lemayev, minister of the petroleum refining and petrochemical industry, A. Kochetkov, first deputy minister for the production of mineral fertilizers, G. Merkulov, deputy chairman of the USSR State Committee for Material and Technical Supply, and deputies M. Paryshkura and N. Nadson.

At the meeting it was observed that development of sectors of the chemical complex is going on at extremely rapid rates. This trend should be preserved in the 12th Five-Year Plan as well. The production of resins and plastics, for example, is scheduled to increase by more than 140 percent, chemical plant protection agents by 135 percent, fibers and threads by 133 percent, and goods intended for cultural-consumer and domestic use by more than 146 percent.

Plans call for obtaining a substantial proportion of the increased production as a result of technical reoutfitting and reconstruction of enterprises, and the adoption of new equipment and advanced technological processes.

The economic leaders, specialists, and deputies who spoke at the meeting devoted a great deal of attention to the work of the petroleum refining industry. This was connected mainly with the fact that the sector did not manage to meet targets in a number of important indicators during the 11th Five-Year Period. In particular, the construction of projects for the production of oils and additives, as well as facilities for coke calcination [prokalka], has been protracted, which led to serious intersectorial and intrasectorial imbalances.

In enterprises of the sector, consumption of labor, energy and materials resources is still too high. Thus, as observed at the meeting, the USSR Ministry of Petroleum Refining and Petrochemical Industry and its contracting organizations face a very great deal of work in the current 5-year period to eliminate these negative phenomena in the sector's development.

By 1990 the volume of petroleum refining is scheduled to increase by 5 percent as compared with 1985. This will be achieved by increasing the extraction and assimilation of oil fields in the Caspian Lowlands, Western Kazakhstan and the Orenburg area and Astrakhan Oblast.

The plans drawn up call for increasing the production of motor fuel by more than 12 percent. The production of gasoline and diesel fuel for motor vehicles will be increased.

Participants in the meeting focused a great deal of attention on issues of accelerating scientific and technical progress in the sectors of the chemical complex. And this is appropriate. For example, the Ministry of Chemical Industry increased the output of construction materials by a factor of 6 and brought it up to 55,000 tons per year. We can talk about successes like this. But if we compare our indicators to the achievements of the leading capitalist countries, we see that we have nothing to rejoice about.

The individual proportion of synthetic fibers and threads in the total volume of production of chemical fibers is scheduled to increase from 55.6 percent in 1985 to 65 percent at the end of this 5-year period. And again let us make the comparison: the level worldwide is 88.5 percent. In short, we are still lagging noticeably. It is sufficient to say that today we are inferior to the developed Western countries in five out of eight indicators of the technical level of goods of the chemical complex.

At the meeting many other figures were heard which testified better than any words to the importance of technical progress. For example, assimilating the production of modern chemical construction materials is making it possible to save more than 1 million tons of steel and nonferrous metals. The economic effect is 1.5 billion rubles! The manufacture and use of new forms of membranes in the production of caustic soda will make it possible to save approximately 1 million tons of fuel, which saves 800 million rubles per year. The use of new chemical plant protection agents will reduce the losses of grain by 2 million tons.

A year ago, in examining the draft of the plan for 1986, the meeting of the preparatory commission criticized a number of ministries of the chemical complex. As it turned out, definite conclusions were drawn from this. For example, the Ministry of Mineral Fertilizer Production included in the plan the assimilation of capacities to produce 10,000 tons of polycarbonate in the Ufa Khimprom Association. It has also planned the construction of an enterprise which will produce 700,000 tons of sulfuric acid annually.

Minister of Chemical Industry V. Listov particularly emphasized that all of the increased production of goods in the sector will be achieved by increasing labor productivity.

This same goal was placed before collectives of the petroleum refining and petrochemical industry. This sector has also worked out a major program to use secondary resources. There are many reserves here. Let us take, for example, the following question. Today only 20 percent of all worn-out tires are recycled, the rest are burned.

How long will this sort of irresponsible management flourish?

This question of the deputies, which was heard at the session, was answered by Minister of Petroleum Refining and Petrochemical Industry N. Lemayev as follows:

"By 1990 we plan to bring the recycling of worn-out tires up to 65 percent, and by the end of this century to 100 percent. The use of secondary resources will make it possible to save 340,000 tons of rubber, 672,000 tons of lubricant oils, and 334,000 tons of sulfuric acid within the 5-year period."

Question: How successfully is work going to construct projects for comprehensive petroleum refining?

A. Lemayev: "The minister of chemical industry has already spoken here on the slow assimilation of capital investments. We are in approximately the same position. In the 11th Five-Year Plan there were approximately 1 billion rubles not assimilated. A certain shift has now been noticed, but it is still impossible to consider the situation satisfactory: in 4 months 22 million rubles were not assimilated. Construction workers should draw the necessary conclusions."

Deputy N. Nadson's speech was incisive:

"The inadequate effectiveness of capital investments can be charted based on the example of our kolkhoz. While in the past two 5-year periods the fixed capital of the farm almost doubled, the growth in the volumes of production totaled only 40 percent. What were the reasons for this? The primary reason was that the yield of cereal crops, potatoes, and vegetables increased too slowly. And this occurred because our needs for mineral fertilizers and chemical plant protection agents were far from fully satisfied. We received only half as much of them as we needed.

"Also, we do not have the necessary collection of machines for intensive technologies. There are not enough sprayers, and we do not have satisfactory equipment for introducing liquid fertilizers into the soil. I believe that the deputies will support me if I say this: the levels which the workers of the Ministry of Mineral Fertilizer Production have planned for themselves must be considered not high enough. Urgent measures must be taken to reduce the times needed to assimilate new capacities, improve the use of existing capacities, and increase the production of mineral fertilizers and chemical plant protection agents as much as possible...."

The preparatory commission drew up remarks and proposals which will be considered in preparing the conclusion of the standing commissions of the chambers of the USSR Supreme Soviet on the State Plan of Economic and Social Development of the USSR for 1986-1990.

UDC 66:537.226

USE OF FERROELECTRIC PACKING FOR REMOVAL OF HIGHLY DISPERSED PARTICULAR IMPURITIES

Kiev KHMICHESKAYA TEKHNOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 18 Mar 86) pp 36-38

[Article by A. V. Sandulyak and V. L. Dakhnenko, Ukrainian Institute of Water Engineering]

[Abstract] A variety of experimental studies was conducted on the use of ferroelectric packing for the removal of particulate impurities from liquids and gases, which demonstrated that a barium titanate-based system constitutes a very efficient system with high flow rates (75-170 m/h). The testing was conducted with large-fraction (2-3 mm) ferroelectric packing, and external electric fields ranging from 8.5 to 37 kV/m. The experimental data showed that the following equation has universal application to such systems:
 $\Psi = 1 - \exp(-\alpha L)$, where Ψ is the efficiency of purification, α is the uptake coefficient for the impurities by the packing, and L is the length of the column. The use of ferroelectrics represents a novel purification technology, that may be used independently or in combination with magnetic purification methods. Figures 2; references 7: 5 Russian, 2 Western.

12172/12947
CSO: 1841/604

UDC 541.128

CATALYTIC REDUCTION OF NITROGEN OXIDES BY CARBON MONOXIDE IN PRESENCE OF OXYGEN

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 10 Jul 85) pp 16-18

[Article by M. G. Martsenyuk, S. N. Orlik and V. A. Ostapyuk, Institute of Physical Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] An evaluation was conducted on the effects of the presence of small quantities of oxygen (0.1%) on the reduction of nitrogen oxides over Pd catalysts, to assess such systems for removal of pollutants from among combustion products of natural gas. The laboratory data demonstrated that oxygen accelerates the CO + NO reaction over Pd catalysts, facilitating the start of reduction at a temperature some 50°C lower than in the absence of oxygen. The full equation for the reaction can be depicted by $2\text{NO} + \text{CO} = \text{N}_2\text{O} + \text{CO}_2$. The action of oxygen in eliminating nitrogen oxides over Pd catalysts was also effective in studies with effluents obtained from the combustion of natural gas. At 330-350°C the degree of oxidation of CO to CO₂ reaches 90-100%, while reduction of NO to N₂ is only 20-50% complete. At 400-450°C ca. 60% transformation is attained with NO to N₂, with 100% CO to CO₂ transformation. Figures 2; references 3 (Russian).

12172/12947
CSO: 1841/604

UDC 541.138

PRODUCTION OF POTASSIUM HYDROXIDE WITH LOW CHLORIDE CONTENT

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 4, Jul-Aug 86 pp 24-27

[Article by L. N. Zalesskaya, Ye. V. Leontovich, A. F. Mazanko and V. P. Chviruk]

[Abstract] Trials were conducted on the efficiency of the Soviet MF-4SK membrane for electrolytic production of KOH in lowering chloride levels to acceptable concentrations (0.01-0.007%). The electrolysis was conducted at $70 \pm 2^\circ\text{C}$ with 0.06-0.3 A/cm² currents. The data showed that more concentrated solutions of KOH may be obtained than of NaOH because of the smaller degree of hydration of K⁺ ions. Under the selected experimental conditions a 30% KOH solution was obtained, containing 0.006% Cl⁻ (as KC1), 0.0007% Ca, 0.00015% Fe, 0.00004% Mg, < 0.008% sulfates, and < 0.00005% heavy metals. Figures 2; references 16: 2 Polish, 10 Russian, 4 Western.

12172/12947
CSO: 1841/604

UDC 66.012-52:681.3.06

AUTOMATED CALCULATION SYSTEM FOR COMPLEX DYNAMICS IN CHEMICAL TECHNOLOGY

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 26 Dec 84) pp 43-47

[Article by G. G. Arunyants, A. S. Daniyelyan, Ye. A. Sharabkhanyan, M. A. Rafaelyan and G. Ye. Kanevets, Yerevan Department of the Okhtin, Scientific Production Association "Plastpolimer"]

[Abstract] Description is provided for the use of the DINSIS system for continuing analysis of complex processes in chemical technology, relying on the transfer function of the various elements. DINSIS encompasses three subsystems--TRANSF, MESON and RESPON--which allows for separate temporal analysis of different subcomponents of the technical process in planning and system control. The DINSIS system is written in the algorithmic PL/I OC EC (MVT 6.1.9) language, and has been successfully applied in the planning of process steps and control systems in the production of vinyl acetate and its derivatives. Figures 2; references 4: Russian.

12172/12947
CSO: 1841/604

UDC 541.121/.123:536.7

PREDDESIGN OPTIMIZATION OF CHEMICAL TECHNOLOGY

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 27 May 85) pp 47-50

[Article by A. I. Rozenfeld, Institute of Special Problems in Material Sciences, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] For economical and technical efficiency of chemical processes close correlation must be achieved between predesign mathematical models and experimental data, with studies based on evaluation of thermodynamic parameters offering obvious advantages when backed-up by data processing technology. Through the control of such basic factors as temperature and pressure and the use of the automated thermodynamic data monitoring system ASTRA, developed at the Institute of Special Problems in Material Sciences, UkrSSR Academy of Sciences, optimal conditions for chemical equilibrium can be determined in terms of the desired product. A systematic approach such as this to the design of cost-effective chemical process technology is now quite feasible with the advances made in computer sciences, and bears wider application. References 4: Russian.

12172/12947
CSO: 1841/604

UDC 66.011

NONSTATIONARY CATALYTIC TREATMENT OF EXHAUST GASES FROM PLANTS

Kiev KHIMICHESKAYA TECHNOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 10 Dec 85) pp 66-73

[Article by Yu. Sh. Matros and V. A. Chumachenko, Institute of Catalysis, USSR Academy of Sciences, Novosibirsk]

[Abstract] Description is provided of a nonstationary catalytic method for the treatment of industrial effluent gases, and the advantages it offers over stationary methods. The principal advantage of the nonstationary process is the absence of recovery-type heat exchangers, with heat exchange taking place in the catalytic layer itself. In this system, the catalyst fulfills its primary role in accelerating oxidation and, in addition, functions as a heat regenerator. The large surface of the catalytic heat exchanger assures a highly efficient process of heat transfer within the context of a much smaller device. Testing of the system at the Novosibirsk Chemical Plant engaged in the production of plasticizers and at the Omsk Synthetic Rubber Plant confirmed the utility of this system and its applicability to large-scale effluent gas treatment. Figures 4; tables 3; references 16: 15 Russian, 1 Polish.

12172/12947
CSO: 1841/604

COMBUSTION

METALLURGY AND OPTICS

Moscow MOSCOW NEWS in English No 26, 6-13 Jul 86 p 10

[Article by A. Presnyakov: Surprises of "optical" metallurgy]

[Text] Scientists at the A. Baikov Institute of Metallurgy, USSR Academy of Sciences, have studied the effect of plasma formation--heating gas with a laser beam to a temperature of tens of thousands of degrees.

There are three openings in a massive steel chamber designed to stand a pressure of up to 200 atmospheres. One is intended to let through the beam of a quantum laser generator, another makes it possible to film at high speed the processes taking place within the chamber, and the third "lights up" the plasma for the spectrometer.

Before an experiment starts, the target--a metal plate--is installed inside the chamber and its hatch is hermetically sealed. Nitrogen is let into the chamber through a pipe from a high-pressure cylinder.

The command "start" is pressed on the control panel, and a laser beam penetrates through a transparent cover of the opening.

"A so-called 'optical breach'--a microcloud with a temperature of up to 20,000 degrees--is formed under the action of the beam," explains Professor Alexander UGLOV, director of the research project. "A chemical reaction occurs between the nitrogen and the metal of the target and forms the hard armor of nitride. And if it is replaced with carbonic acid or methane, carbide is formed on the surface of the target as a result of the reaction."

In the course of experiments researchers have established that just one "shot" of a high energy density laser beam can form nitride or carbide, depending on the surrounding medium, on the metallic surface of the target.

What has to be done to cover the entire area of the metal plate with a thorough layer of these compositions? Scientists put forward a method of scanning, that is, sliding with a beam "along the lines" of an electronic bunch in the kinescope-screen of a TV set. But it is also possible to rotate the plate in front of a fixed beam of the laser.

The nitrides and carbides of metals possess a very high degree of sturdiness and heat resistance. That is why they have attracted the attention of specialists in industry. Scientists in metallurgy and workers of sectoral research institutes, production associations and enterprises carry out joint work in the use of new technology to strengthen the parts and units of machines and mechanisms. In particular, new methods are being developed to toughen up the rings of drilling installations, the main parts of tractors and agricultural machines, and medical instruments.

/12947
CSO: 1841/3E

ELECTROCHEMISTRY

UDC 541.13

ELECTROCHEMICAL CHARACTERISTICS OF COMPOSITES FORMED FROM GRAPHITE AND TUNGSTEN SILICIDE

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 59, No 7, Jul 86
(manuscript received 9 Jul 84) pp 1497-1503

[Article by N. P. Matveyko and G. Ye. Slepnev, Belorussian Polytechnic Institute]

[Abstract] Determinations were made of the electrochemical characteristics of electrodes formed from WSi₂ and graphite, since silicides of transition metals are known to have high electrical conductivity and chemical stability. Porosity of such electrodes decreased from 13.8% for electrodes with 5 wt% graphite to 3.2% for 90 wt% graphite samples. However, electrical resistance was relatively little affected by the proportions of graphite and WSi₂, ranging from 0.23×10^{-3} ohm x m for WSi₂ electrodes to 0.47×10^{-3} ohm x m for graphite electrodes. Assessment of anodal polarization demonstrated that in the case of electrodes with less than 5 wt% graphite a silicon oxide film forms on the anode in NaCl and KI solutions. The latter possesses high resistance and results in increased polarization of the electrodes. Addition of graphite has the beneficial effects of rendering the silicon oxide film more electroconductive as well as in retarding its formation. An inverse relationship prevailed between resistance of the electrodes to corrosion and the graphite content, with anodal loss in chlorine production due largely to graphite decomposition. In addition, the presence of graphite also favored increased solubility of WSi₂ under such conditions. Similar problems were encountered with iodide ion oxidation. Figures 5; references 19 (Russian).

12172/12947
CSO: 1841/9

INORGANIC COMPOUNDS

UDC 546.723:546.32:54-31

POTASSIUM POLYFERRITES WITH BETA-ALUMINUM OXIDE

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 52, No 9, Sep 86
(manuscript received 7 Feb 85) pp 917-919

[Article by A. G. Belous, Ye. B. Novosadova and Ye. V. Pashkova, Institute of General and Inorganic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Physicochemical and electrophysical studies were conducted on ceramics with the composition $K_2O \cdot nFe_2O_3$, where $n = 4.5-10$, to determine the phase composition and characteristics of the hexagonal crystalline structure of these potassium polyferrites. X-ray data demonstrated that the width of the $K^{+1}-O^{-2}$ layer ($5.016-5.069 \pm 0.005 \text{ \AA}$) in the potassium polyferrites was somewhat greater than the width of the $Na^{+1}-O^{-2}$ in sodium polyaluminum oxides (4.76 \AA), in accordance with the difference in the ionic radii of K^+ and Na^+ . Electrical conductivity increased in direct proportion of $Fe_2O_3 : K_2O$ to $6.5-6.8$, while a further increase in the ratio resulted in a marked drop in conductivity as a result of reduction in the phase with the beta-aluminum oxide structure. Ceramic samples of high density also showed high conductivity. At 360°C the overall conductivity of samples with a $Fe_2O_3 : K_2O$ ratio of $5.5-6$ was $0.61 \times 10^{-2} \text{ ohm}^{-1} \times \text{cm}^{-1}$. Total conductivity was largely due to ionic conductivity (92.0-93.4%; potassium cations), with electronic conductivity representing a minor component (6.6%; $0.41 \times 10^{-3} \text{ ohm}^{-1} \times \text{cm}^{-1}$). Figures 2; references 7: 4 Russian, 3 Western.

12172/12947
CSO: 1841/11

UDC 542.61:541.13

BEHAVIOR OF SEVERAL METAL 8-QUINOLINEDITHIOCARBOXYLATES AS LIQUID MEMBRANE ELECTRODES

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHMICHESKAYA in Russian
No 4, Jul-Aug 86 (manuscript received 17 Dec 85) pp 423-427

[Article by O. A. Lebedeva and E. Yu. Yanson, Latvian State University imeni P. Stuchka]

[Abstract] The functional parameters of Pb (II), Tl(I), Cu(II), Co(II), Ni(II) and Mn(II) 8-quinolinedithiocarboxylates as liquid membrane electrodes were tested under a variety of conditions. The useful range of the electrodes covered five pH units (3 to 8), with the stability of these ion-selective electrodes diminishing in the following series: Cu(II) >> Mn(II) > Co(II) > Ni(II) > Tl(I) > Pb(II). Consequently, the Tl(I) and Pb(II) electrodes functioned most efficiently in ion selection, particularly in chloroform solvent. A significant potential drift (10-15 mV/day) was recorded which did not, however, affect the operational characteristics of the electrodes. The useful lifetime of these electrodes was on the order of 10 to 14 days. Figures 5; references 12: 1 Russian, 1 Polish, 4 Romanian, 6 Western.

12172/12947
CSO: 1841/12

UDC 621.726:546.821'17

SURFACE COMPOSITION OF HIGHLY DISPERSED COMPOSITES OF TITANIUM AND ALUMINUM NITRIDE POWDERS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 4, Jul-Aug 86 (manuscript received 15 Mar 86) pp 500-501

[Article by Yu. M. Shulga, A. A. Kuzyukovich, Ya. K. Vayvad and T. N. Miller, Department of the Institute of Chemical Physics, USSR Academy of Sciences; Institute of Inorganic Chemistry, Latvian SSR Academy of Sciences]

[Abstract] X-Ray photoelectronic spectroscopy was employed in a study of the surface composition of composites of titanium and aluminum nitride powder. Analysis of the spectra demonstrated that, on the surface, the $[Ti]/[Al]$ ratio was smaller by an order of magnitude than the corresponding atomic ratio in bulk. These findings confirmed previously published results of chemical analyses which indicated that on the surface titanium nitride crystals are shielded by aluminum nitride. References 5 (Russian).

12172/12947
CSO: 1841/12

ION EXCHANGE PHENOMENA

UDC 621.359.7

MODIFIED MONOPOLAR ION EXCHANGE MEMBRANES FOR GENERATION OF HYDROGEN AND HYDROXYL IONS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 59, No 7, Jul 86
(manuscript received 16 Nov 84) pp 1486-1488

[Article by O. R. Shendrik, M. I. Ponomarev and V. D. Grebenyuk, Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences]

[Abstract] Studies were conducted on possible means of increasing the efficiency of H^+ and OH^- yields in electrodialytic processes using monopolar ion exchange membranes rather than standard approaches relying on bipolar membranes. The monopolar systems couple counter-ion transport with generation of H^+ and OH^- , with the yield directly dependent on the concentration of salt ions at the contact site of antipolar ion exchange materials and the concentration of the salt ions in turn dependent on diffusion processes. Comparison of the expenditures of electric energy for the generation of H^+ and OH^- has shown that processes relying on monopolar ion exchange membranes are more efficient than for the best Soviet bipolar membranes (MB-3) when changes in pH of the solution involve demineralization and concentration of the salt. Figures 1; tables 2; references 3 (Russian).

12172/12947
CSO: 1841/9

UDC 541.13

MASS EXCHANGE OF MERCURY IONS ACROSS ORGANIC MEMBRANES IN BASIC SOLUTIONS

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 59, No 7, Jul 86
(manuscript received 11 Jun 84) pp 1517-1520

[Article by V. K. Kleshchuk, I. A. Aleksandrova, I. N. Legkiy and V. A. Nikolskiy]

[Abstract] A mathematical analysis was conducted on mass exchange of mercury ions across organic membranes, dealing largely with polyethylene films functioning as molecular sieves in this respect. Although the polyethylene membranes have been shown to have the potential for translocation of mercury ions via its functional groups, i.e., the capacity to behave as a cation exchanger, the major mechanism responsible for mercury transport involved diffusion in the membrane pores. The latter conclusion was substantiated by the virtual identity of the energies of activation (ca. 5.2 kcal/mole) for the diffusion of mercury ions in the electrolyte and the polyethylene membrane. Furthermore, the ionic species undergoing mass exchange was identified as complexes of the following type: Hg(OH)_3^- and/or Hg(OH)_4^{2-} .

References 6: 5 Russian, 1 Western.

12172/12947
CSO: 1841/9

UDC 666.968

SODIUM METATUNGSTATE ADHESIVES

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 59, No 7, Jul 86
(manuscript received 15 Nov 85) pp 1625-1626

[Article by N. Yu. Isupova, G. M. Barvinok and M. M. Sychev, Leningrad Technologic Institute imeni Lensoviet [Leningrad Soviet]]

[Abstract] Sodium metatungstate was prepared by the reaction of freshly precipitated tungstic acid with sodium paratungstate, yielding a product with a density of 3.0 g/cm³ and a pH of 1.8-2.0. Subsequent studies with various conventional hardeners and fillers demonstrated that MgO and ZnO imparted the optimal characteristics in terms of mechanical stability. In addition, the adhesive in question was also found to be compatible with the acidic filler SiO₂. Spectroscopic analyses indicated that the reaction of sodium metatungstate with the various fillers involved polycondensation of the former and hydration of the filler, with the formation of heteropolycompounds as the final product. Figures 1; references 8 (Russian).

12172/12947
CSO: 1841/9

ORGANO-METALLIC COMPOUNDS

UDC 547.242

ORGANOARSENIC COMPOUNDS WITH As=N BOND. PART 1. SYNTHESIS, PROPERTIES
AND SPECTRAL STUDIES ON TRIARYLARSAZOARYLS

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86
(manuscript received 10 Sep 85) pp 1794-1798

[Article by G. I. Kokorev, F. D. Yambushev and Sh. Kh. Badruttinov, Kazan
State Pedagogic Institute]

[Abstract] Various triarylarsazoaryls were synthesized by the reaction of a mixture of a primary aromatic amine and triethylamine with triaryldichloro-arsenic derivatives, with IR spectroscopic analysis of the products. Specifically, triphenylarsazophenyl was synthesized by the reaction of triphenyldichloroarsenic with a mixture of aniline and triethylamine at 5-10°C for 8-10 h in benzene under argon. The intense absorption at 907 cm^{-1} on IR spectra of the product was attributed to the As=N bond, and the disappearance of this band on hydrolysis of triphenylarsazophenyl and appearance of an intense band at 897 cm^{-1} was attributed to its replacement by the As=O group. Figures 1; references 14: 8 Russian, 6 Western.

12172/12947
CSO: 1841/3

UDC 547.241

REACTION OF *o*-HYDROXYACETOPHENONES WITH SILYL PHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 56, No 8, Aug 86
(manuscript received 28 Oct 85) pp 1813-1818

[Article by T. N. Popkova, T. S. Kukhareva, A. R. Bekker and E. Ye. Nifantyev]

[Abstract] Investigations were conducted on the reactions of silylated *o*-hydroxyacetophenones with silyl phosphites, which resulted in the formation of silylated dihydroxybenzylphosphonates. The latter were confirmed spectroscopically, and were also demonstrated to undergo partial cyclization into diasteriomic benzoxaphospholanes. In addition, compounds with a tert-butyl group on the benzene ring were shown to possess greater chemical stability. For example, while 2-oxa-2-ethoxy-3-methyl-3-trimethylsiloxy-4,5-(8'-methylbenzo)-1,5-oxaphospholane underwent hydrolysis at room temperature with ring opening, only partial hydrolysis at 80°C was seen in the case of 2-oxa-2-ethoxy-3-methyl-3-trimethylsiloxy-4,5-(8'-methyl-6'-tert-butylbenzo)-1,5-oxaphospholane and 2-oxa-2,3-ditrimethylsiloxy-3-methyl-4,5-(6'-tert-butyl-8'-methylbenzo)-1,2-oxaphospholane. References 6: 4 Russian, 2 Western.

12172/12947
CSO: 1840/3

ORGANOPHOSPHORUS COMPOUNDS

UDC 542.91:547.1'118

REACTION OF 1,3-DIPHENYLPROPANETRIONE WITH DIMETHYL PHOSPHITE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 8, Aug 86 (manuscript received 4 Feb 85) pp 1860-1864

[Article by N. A. Polezhayeva, O. V. Ovodova, I. A. Litvinov, Ye. V. Yelshina, V. A. Naumov and B. A. Arbuzov, Chemical Institute imeni A. M. Butlerov, Kazan State University imeni V. I. Ulyanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] Further studies were conducted on the addition reactions between dialkyl phosphites with alpha-ketones, by investigating the reactions of 1,3-diphenylpropanetrione-1,2,3 (DPPT) with dimethyl phosphite (DMP) in the presence and absence of Et₃N. Reaction of DPPT with DMP in CH₂C₁, for several days at ca. 20°C led to the formation of dimethyl(dibenzoylmethyl)-phosphate. The same product was isolated following reaction of DPPT with trimethyl phosphite. Reaction of DPPT with DMP in CH₂C₁, and Et₃N resulted in the isolation of dimethyl(1-benzoyl-2-phenylvinyl)phosphate, a product also obtained by the reaction of dimethyl(dibenzoylmethyl)phosphate with DMP in CH₂C₁, and Et₃N at ca. 20°C for one day. Figures 1; references 3: 2 Russian, 1 Western.

12172/12947
CSO: 1841/6

UDC 542.91:541.69:547.1'118

SYNTHESIS AND ANTICHOLINESTERASE ACTIVITY OF S-ALKYL DIETHYLTHIOPHOSPHATES
CONTAINING HYDROPHOBIC OR ONIUM GROUPS IN THIOALKYL RADICAL

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 8,
Aug 86 (13 Mar 85) pp 1864-1868

[Article by N. N. Godovikov, L. A. Vikhreva, Ye. K. Balashova, A. P. Brestkin,
S. N. Moralev, V. I. Rozengart, O. Ye. Sherstobitov and M. I. Kabachnik,
Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy
of Sciences, Moscow; Institute of Evolutionary Physiology and Biochemistry
imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] A structure-activity correlational study was conducted on the anticholinesterase effectiveness of S-alkyl diethylthiophosphates, with the thioester moiety containing hydrophobic or onium groups and acetylene bonds. Evaluation of seven such compounds against mammalian and insect acetyl-, butyl- and cholinesterases demonstrate that a cationic group in the ω position of the thioethynyl radical had an adverse impact on the fit between the inhibitor and the enzyme active site. Evidently, the presence of an onium-type acetylene bond introduced a degree of structural rigidity that diminished fit and subsequent phosphorylation of the active site. As a result, the inhibitory activity of such compounds suffered in comparison with that exhibited by the corresponding sulfide analogs. References 6: 5 Russian, 1 Western.

12172/12947
CSO: 1841/6

UDC 541.128:661.5:546.17:546.65

FIXATION OF MOLECULAR NITROGEN BY RARE EARTH METAL COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 8,
Aug 86 (manuscript received 10 Nov 85) pp 1898-1900

[Article by M. N. Bochkarev, A. A. Trifonov, G. A. Razuvayev, M. A. Ilatovskaya
and V. B. Shur, Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov,
USSR Academy of Sciences, Moscow; Institute of Chemistry, USSR AS, Gorky]

[Abstract] Studies were conducted which demonstrated that the cyclopentadienyl complexes Yb(II), Sm(III), Ce(III), Eu(III) and CeCl₃, were capable of N₂ fixation under the appropriate conditions. The fixation required an excess of sodium naphthalene, with the reaction conducted at ca. 20°C in THF under atmospheric pressure. Subsequent hydrolysis resulted in the release of NH₃. Optimal yields were obtained with Cp₂Yb-C₁₀H₈-Na⁺, represented by a NH₃ yield of 0.15-0.25 moles per mole of complex. Replacement of sodium naphthalene by lithium naphthalene had no significant effect on fixation of N₂ and formation of NH₃. References 9: 4 Russian, 5 Western.

12172/12947

CSO: 1841/6

UDC 547.26'118

REACTION OF DIALKYL PHOSPHITES WITH 2,3-DIPHENYLINDENONE

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86
(manuscript received 26 Jul 85) pp 1691-1696

[Article by B. A. Arbuzov, A. V. Fuzhenkova and N. A. Banderova, Scientific Research Chemistry Institute imeni A. M. Butlerov, Kazan University imeni V. I. Ulyanov-Lenin]

[Abstract] In view of the paucity of data on electrophilic and nucleophilic addition reactions involving indene, particularly the 2,3-substituted congeners, studies were carried out on the reaction of dialkyl phosphites with 2,3-diphenylindenone to fill the gap. Dialkyl phosphites were found to add to the carbonyl group of 2,3-diphenylindenone in the presence of Et₂NH, leading to the formation of dialkyl(2,3-diphenyl-1-oxy-2-indenyl) phosphonates. The latter underwent rearrangement--in the presence of Et₂NH--to dialkyl(2,3-diphenyl-2-indenyl) phosphates. References 12: 7 Russian, 5 Western.

12172/12947
CSO: 1841/3

UDC 547.1'118

REACTION OF DIETHYLDITHIOPHOSPHOROUS ACID WITH TERTIARY PHOSPHINES AND
HEXAETHYLTRIAMIDOPHOSPHOROUS ACID

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86
(manuscript received 9 Oct 85) pp 1697-1699

[Article by V. A. Alfonsov, G. U. Zamaletdinova, K. M. Yenikayev, A. V. Ilyasov, E. S. Batyyeva and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] ^1H and ^{31}P NMR and IR spectroscopy and chemical analysis were used to monitor the reaction of diethyldithiophosphite with tert. phosphines and hexaethyltriamidophosphite (I). At -40°C the reactions with tripropylphosphine and I led to the formation of 1:1 quasiphosphonium adducts with P-P bonds. At higher temperatures tripropyl- and triphenylphosphine reacted with the formation of the corresponding phosphine sulfides. These results indicate that the thioalkyl group behaves more like the alkyl group than an alkoxy or dialkylamide group in reactions with III. Figures 1; references 4 (Russian).

12172/12947
CSO: 1841/3

UDC 547.26'118

REACTION OF THIOESTERS AND AMIDOTHIOESTERS OF PHOSPHOROUS ACID WITH POLY HALOGENATED METHANE DERIVATIVES AND ALKYL HALIDES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 21 Nov 85) pp 1700-1707

[Article by O. G. Sinyashin, Sh. A. Karimullin, V. P. Kostin, E. S. Batyyeva and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] To assess the coordination of the phosphorus atom in reactions of thioesters and amidothioesters of phosphorous acid with various alkyl halides, a series of such reactions were subjected to critical analysis. Coordination of the P atom was retained in reactions of trialkyltrithiophosphites with CCl_4 , leading to the formation of dialkylchlorodithiophosphites, dialkyl disulfides, and trichloromethyl dithiophophonites. The latter were also obtained, in addition to tetrathiophosphates and alkyl bromides, in reactions of trithiophosphites with CCl_4Br . Reaction of S-alkyl-N,N-tetraethylamidodithiophosphites and S,S-dialkyl-N-diethylamidodithiophosphites with CCl_4 involved substitution of thioalkyl group on P(III) by a Cl atom and formation of the corresponding acid chlorides. The reaction with amidodithiophosphites requires catalysis by ZnCl_2 . Finally, reaction of the amidodithioesters with alkyl halides proceeds either via Arbuzov rearrangement or replacement of the thioalkyl group on P(III) by the halogen atom. References 24: 16 Russian, 8 Western.

12172/12947
CSO: 1841/3

UDC 547.241

REACTION OF PHOSPHOROUS ACID ESTERS WITH HEPTAFLUOROBUTYRIC ACID ANHYDRIDE.
PART 3. DONOR-ACCEPTOR INTERACTIONS

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 25 Dec 84) pp 1755-1758

[Article by V. I. Krutikov, S. F. Aleynikov and A. N. Lavrentyev, Leningrad Technologic Institute imeni Lensoveta [Leningrad Soviet]]

[Abstract] Spectroscopic studies were conducted on the donor-acceptor interactions in the reaction of heptafluorobutyric acid anhydride with esters of phosphorous acid, which demonstrated that, in reactions of dialkyl phosphites with the anhydride, the initial stage involves formation of molecular complexes with hydrogen bonds. Further confirmation for hydrogen bonding was provided by studies on the reaction of trialkyl phosphites with the anhydride. In the latter type of reactions nucleophilic attack of the P atom on the carbonyl C atom is facilitated and the formation of a hydrogen bond is excluded. As a result, donor-acceptor 1:1 complexes are formed, for which confirmation was obtained by calorimetric titration. These observations indicate that analogous mechanisms prevail in the reaction of di- and trialkyl phosphites with heptafluorobutyric acid anhydride. Figures 2; references 7 (Russian).

12172/12947
CSO: 1841/3

UDC 546.18+547.26'118

TRICYCLIC 1,3,2, λ^5 ,4 λ^5 -DIAZADIPHOSPHETIDINES

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 1 Apr 85) pp 1758-1763

[Article by B. N. Kozhushko, Ye. B. Silina, V. V. Doroshenko (deceased), I. K. Mikhaykyuchenko and V. A. Shokol, Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Fourteen tricyclic 1,3,2 λ^5 ,4 λ^5 -diazadiphosphetidines were synthesized by the reaction of dialkyl or diaryl isocyanophosphites with alkyl or aryl isocyanates at 5-10°C for several hours. The products were identified spectroscopically, with information on empirical formulas, thermal decomposition, and yields summarized in tabular form. Heating of the diazadiphosphetidines in vacuo above the temperature of thermal decomposition led to resolution to the starting isocyanates which, after distillation, react to give the original crystalline diazadiphosphetidines. References 14: 1 Ukrainian, 12 Russian, 1 Western.

12172/12947
CSO: 1841/3

UDC 541.6:547.241:543.422.2

SYNTHESIS AND PHOSPHOTROPIC TAUTOMERISM OF PHOSPHORYLATED N-SUBSTITUTED AMINO(IMINO)THIAZOLI(DI)NES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 5 Nov 85) pp 1764-1773

[Article by V. V. Negrebetskiy, N. N. Vorobyeva, L. V. Razvodovskaya, L. Ya. Bogelfer, V. I. Ivanchenko, A. F. Grapov and N. N. Melnikov, All-Union Scientific Research Institute of Chemical Agents for Plant Protection, Moscow]

[Abstract] Spectroscopic and thermodynamic studies were conducted to assess the mechanisms of synthesis and phosphotropic tautomerism of phosphorylated N-substituted amino(imino)thiazoli(di)nes. Phosphorylation of the 2-substituted amino(imino)thiazoli(di)nes was shown to be dependent on the electronic and steric features of the substituent on the exocyclic nitrogen atom, with the primary step consisting of phosphorylation of the endocyclic nitrogen atom. The absence of a concentration effect on the kinetics of phosphotropic migration indicated their largely intramolecular nature. Analysis of the thermodynamic parameters, including activation correlates, for the migration of the phosphoryl groups in the acyclic and cyclic amidine systems substantiated the role of geometric considerations and substituents on the phosphorus atom and the exocyclic nitrogen atom in determining phosphotropic tautomerism, including the effects of solvent polarity and temperature. Figures 1; references 11: 5 Russian, 6 Western.

12172/12947
CSO: 1841/3

UDC 547.241'547.24

SYNTHESIS AND PROPERTIES OF PHENYL(DIALKYLAMINO)IODOPHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 28 Oct 85) pp 1777-1781

[Article by T. V. Kovaleva and N. G. Feshchenko, Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Description is provided of the approaches used in the synthesis of phenyl(dialkylamino)iodophosphines (I) by the reaction of phenyl iodophosphine with silylated secondary amines. The I phosphines reacted readily with electrophilic reagents, e.g., methyl iodide, benzenesulfonic acid azide, phenyl azide, to yield the corresponding alkylated and iminated products. Iodine, for example, catalyzed disproportionation of phenyl(morpholino)iodophosphine (II) to phenyl(dimorpholido)phosphonite and phenyl diiodophosphine. The final products of the reaction of II with iodine were phenyl(dimorpholino)-iodophosphonium triiodide and phenyl diiodophosphine. References 10: 5 Russian, 5 Western.

12172/12947
CSO: 1841/3

UDC 547.1'118

REACTION OF S-ACETYLDIPHENYLTHIOPHOSPHONITE WITH BENZALDEHYDE IN PRESENCE OF HC1

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 21 Nov 85) pp 1905-1906

[Article by V. A. Alfonsov, D. A. Pudovik, E. S. Batyyeva and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] S-Acetyl diphenylthiophosphonite reacted with benzaldehyde in the presence of an equimolar concentration of HC1 with the formation of bis[(alpha-diphenylphosphoryl)benzyl]sulfide (I) and, as a minor product, alpha-acetoxybenzyl diphenylphosphine sulfide. I was isolated from the reaction mixture in the form of a complex with 2 molecules of HC1, and released from the complex in the pure state by treatment with triethylamine.

12172/12947
CSO: 1841/3

UDC 547.1'128'118

REACTION OF DIMETHYLCHLOROTHIOPHOSPHATE WITH N,N-BIS(TRIMETHYLSILYL)ACETAMIDE

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 6 Jan 86) pp 1906

[Article by L. K. Kibardina, M. A. Pudovik and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences]

[Abstract] Dimethylchlorothiophosphate reacted slowly at room temperature and rapidly on heating with N,N-bis(trimethylsilyl)acetamide to form O,O-bis(trimethylsilyl)-S-methylthiophosphate in 72% yield. The process apparently involves intermediate formation of silylamidothiophosphate and its decomposition to silyl phosphate, with subsequent silylation and thion-thiol isomerization. References 1 (Western).

12172/12947
CSO: 1841/3

UDC 547.241

NUCLEOPHILIC SUBSTITUTION ON BICOORDINATED PHOSPHORUS IN P-(AMINO)METHYLENE-PHOSPHINES

Leningrad ZHURNAL OESHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 15 Oct 85) pp 1907-1908

[Article by L. N. Markovskiy, V. D. Romanenko, A. V. Ruban and L. K. Polyachenko, Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Reaction of N,N-bis(trimethylsilyl)amino-C-trimethylsilylmethylene-phosphine at -40°C for 24 h with 2,4,6-tri(tert-butyl)phenyllithium, or the lithium amides Me₃Si(t-Bu)NLi or i-Pr₂NLi resulted in the synthesis of, respectively, P-2,4,6-tri(tert-butyl)phenyl-, N,N-diisopropylamino-, or N-trimethylsilyl-tert-butylamino-C-trimethylsilylmethylenephosphine. The yields of the products ranged from 58 to 76%, and apparently proceeded via a nucleophilic attack on the bicoordinated phosphorus atom with the formation of the intermediate anion $(Me_3Si)_2N-R(X)=Y$, with R = 2,4,6-(t-Bu)₃C₆H₂ and Y = NP, CR₂. Subsequent decomposition of the intermediate anion involved separation of the (Me₃Si)₂N group with low nucleophilic potential. References 3: 1 Russian, 2 Western.

12172/12947
CSO: 1841/3

UDC 546.185'131+547.567.2

REACTION OF PC₁₅ WITH p-BENZOQUINONES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 18 Nov 85) pp 1908-1910

[Article by A.A. Kutyrev, S. G. Fomin and V. V. Moskva, Kazan Institute of Chemical Technology imeni S. M. Kirov]

[Abstract] At room temperature without a catalyst and in an inert solvent (benzene, toluene, hexane), PC₁₅ reacts with p-benzoquinone to form the adducts tris(3-chloro-4-hydroxy-phenoxy)dichlorophosphorane and tris(2,5-dichloro-4-hydroxy-phenoxy)dichlorophosphorane. Structures of the products were confirmed by IR spectroscopy and chemical analysis. References 3: 2 Russian, 1 Western.

12172/12947
CSO: 1841/3

UDC 546.185

TRICHLOROMETHYLATION OF DIAMIDOCHLOROPHOSPHITES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 17 Dec 85) pp 1910-1911

[Article by A. P. Marchenko, I. S. Zaltsman and A. M. Pinchuk, Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] A highly reactive, but poorly studied, derivative of trichloromethylphosphorous acid--bis(diethylamino)trichloromethylphosphine--was synthesized by the binary system of bis(diethylamido)chlorophosphite and hexaethyltriamidophosphite reacted at -50°C in ether and equimolar CCl_4 . Bis(dipropylamino)trichloromethylphosphine was obtained in an analogous manner. References 5: 4 Russian, 1 Western.

12172/12947
CSO: 1841/3

UDC 547.556.7:547.468

CYCLIZATION OF ALPHA-DIAZO-ALPHA-PHOSPHONYLACETONITRILES INTO 4-PHOSPHONYL-5-CHLORO-1H-1,2,3-TRIAZOLES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 25 Nov 85) pp 1911-1913

[Article by A. D. Mikityuk, Yu. A. Strepikheyev and P. S. Khokhlov, All-Union Scientific Research Institute of Phytopathology, Bolshyye Vyazemy, Moscow Oblast]

[Abstract] 4-Dimethoxyphosphonyl-5-chloro-1H-1,2,3-triazole (I) was synthesized by the saturation of alpha-dimethoxy-phosphonyl-alpha-diazoacetonitrile with HCl in absolute ether at room temperature. On standing, I crystallized from solution, while 4-diethoxyphosphonyl-5-chloro-1H-1,2,3-triazole was isolated chromatographically on silica gel L-40/100 column following elution with chloroform:ethanol (9:1). 1-Methyl-4-dimethoxy-phosphonyl-5-chloro-1,2,3-triazole was synthesized by the reaction of I with diazomethane at room temperature overnight. References 5: 2 Russian, 3 Western.

12172/12947
CSO: 1841/3

UDC 547.245

PROTOTROPIC ISOMERIZATION OF ALKENE PHOSPHONIC ACID DICHLORIDES

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 56, No 8, Aug 86 (manuscript received 30 Dec 85) pp 1913-1914

[Article by O. A. Belykh, I. Ye. Gurevich, B. V. Ryabov, A. V. Dogadina and B. I. Ionin, Leningrad Technologic Institute imeni Lensoveta [Leningrad Soviet]]

[Abstract] Complete prototropic isomerization was established on the reaction of 2-propenephosphonyl dichloride with triethylamine, with the formation of E-1 propenedichlorophosphonate, as confirmed by PMR and ^{31}P NMR spectroscopies. Prototropic isomerization was also observed on the reaction of 2,3-dichloro-propenedichlorophosphonate with triethylamine. References 4: 3 Russian, 1 Western.

12172/12947
CSO: 1841/3

PETROLEUM PROCESSING INDUSTRY

EXPERIMENTAL APPROACH TO MANAGEMENT OF PETROCHEMICAL INDUSTRY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Aug 86 p 3

[Text] At the regular session of the Politburo of the CPSU Central Committee, the recommendations of the government to switch to complete self-financed operation in the associations and enterprises of the Ministry of Petrochemical Industry from 1987 have been approved. The aims and ways of the reorganization that has begun were outlined by N. Lemayev, minister of the petroleum refining and petroleum producing industry of the USSR.

In order to lay additional pipelines to the furnaces of the local Heat and Electric Power Plant 2 (TETS-2), the collective of the Saratov petroleum refining plant had to break up part of the wall dividing these facilities. The fuel which had burned before with numerous flames is now fed through new pipes. And the wall opening has become the symbolic break in the inter-departmental partition.

Each flame, consisting of hundreds of thousands of cubic meters of gas is literally gone with the wind. At present, TETS is reliably supplied with a cheap fuel. In this change, the oil industrial workers do not remain behind either: for their own "production" they receive several million rubles per year.

However, such a zealous attitude toward the benefit of the people does not exist everywhere. The reorganization of the industrial operation aims to develop the initiative of the collectives and to utilize fully their potential. This is what the Minister of Petroleum Refining and Petrochemical Industry of the USSR, N. V. Lemayev, pointed out in a conversation with the Tass reporter S. Sakhno.

One of the problems which can be solved by the transition of our enterprises to full self-financed operation is the surmounting of the interdepartmental barriers. Moreover, the interest of the people in the work results has to be increased. For example, until recently, the Saratov company was not free to dispose independently of the profit; it received only an insignificant amount deducted from a substantial sum. Thus, there was no special interest in the

assiduous utilization of the raw materials and secondary resources. The credit for solving the problems of burning flames belongs rather to the power engineers because they took the initiative. However, in many other industrial plants, the burning torches have remained an inseparable detail of the industrial landscape.

This is only one of the many problems which restrain industrial development. Life prompts the necessity of reorganization. Now, all our plants will begin to operate anew. Preparation has already begun. Since the beginning of this year, all the enterprises of the All-Union "Soyuzshina" association have been operating under the new economic conditions. This trial proved the efficacy of the new idea. Now, with complicated tasks, realistically considering the possibilities, we are ready to begin the transition to independent self-financing of the whole industry.

During the preparation for this work and the analysis of the prospects in industrial development in the 12th Five-Year Plan and until 2000, a principally important question arose: what index should be used for evaluating the efficiency of the activity of enterprises and how can the final results of production and the efforts of the working collectives be best expressed?

This is shown by the example of our Moscow plant. Together with the traditional silvery towers, a modern complex was built for thorough refining of the oil. The mazut used for burning in the furnaces of electric power plants is converted by the Muscovites into high-quality gasoline.

The collective has taken the right course. It is also significant that one more plant, the Pavlodar plant, is operating now according to its example. In the current five-year plan, as well as in the future, we have to introduce thorough refining of the oil into all industrial plants. However, universal development of the important initiative is restrained by the notorious dogma--marketable product. It cannot stimulate the collectives to economize on material resources. With respect to this index, it is more suitable to sell the mazut than to expend time and effort to refine it. This also affects work productivity and other indexes, and especially the principle of competition is discredited: because it turns out that those who are in a position to live at the expense of the work of others are in a more favorable situation than the innovators....

At present, such awkward situations are impossible. In the new system of self-financing and self-management, a theoretically new work evaluation is made. Powerful protection from mismanagement is the clean production index. This is marketable products minus material expenditure and amortization. Not to complicate this conversation with economic categories, I am speaking of its main advantage: the companies will obtain maximum profits; they will be able to spend the earnings independently for both the development of production and the solution of social problems. Asking for plan reduction is wrong.

Also, our plants will become literally cleaner in the future: the new index will make everybody put to use that which we only yesterday called waste, and this can solve promptly many problems of environmental protection.

In many others questions, the transition to new conditions of economic management is not reserved only for the industry, but it also affects the suppliers and consumers. We know how difficult it is to produce oil, especially in the northern fields. Many of us have been in the swamps of Siberian fields and in snow-covered tundras. The drillers work under hard conditions to supply our companies with raw material. It is the duty of the workers to handle it economically. In this five-year plan, we have to increase productivity without increasing the amount of raw material. The result is in the new system.

Of course, reorganization is not easy. The main work is still ahead. Much has to be calculated and verified. Let us not omit from the calculations either the psychological inertia or a certain degree of risk: before, the profits insufficiently affected the execution of the plan; now, they are tightly connected. Moreover, the net production index is more "sensitive" to any breaks, any arrhythmia. Its variations--both positive and alarming--are very noticeable to both the enterprises and the whole industry.

It is also important that self-financing also immediately affects people's earnings. The collectives will be interested in working with less personnel; they will be the owners of the salary funds, and will be able to dispose freely of the amount deducted from the profit and to allocate the means for solving social problems.

The first good signs of the changes are seen in the results of the work of our leading facilities, the enterprises of the "Soyuzshina" Association, which had already adopted half a year ago the progressive form of work organization. Here is the last report of the Central Bureau of Statistics of the USSR. Beyond the impartial figures: strenuous work and a search for enthusiasts who assumed the most difficult tasks to be ahead. Almost all the experimenters surpassed the main indexes of delivery and profit. Attention is drawn to the fact that success has been attained with a lower number of people.

Of course, this is not a mechanical reduction of staff, but an indication of the introduction of automation, progressive work procedures, increased skill of people, in a word--the appearance of work activity and interest in work in a new way.

The experience of the first experimenters is hard to overestimate. It will serve as a first orientation factor in the complex process of reorganization not only for our industry, but also for those who follow in their footsteps.

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HITCHES IN SETTING UP GAS-CYLINDER DRIVEN VEHICLES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 May 86 p 2

[Article by A. Levchenko, Alma-Ata, under rubric "A Strict Accounting of Resources": "Profitable But Inconvenient"]

[Text] Seven years ago in Alma-Ata, there appeared automobiles which were distinguished by the fact that they did not smoke, since they operated on liquefied gas. During these years more than 3,000 of them appeared in the city, including 300 light taxis.

Research has proved that motors operating on compressed natural gas work even more economically. Of course, switching over to this requires solving a number of problems. This job was undertaken by the republic Ministry of Automotive Transport. They created a training-production base, and trained drivers, metalworkers, and engineering-technical workers. Approximately 20 motor vehicle enterprises organized special sections for reoutfitting the vehicles, and for repair and technical service of the gas apparatus. The Kazavtotranstekhnika Scientific Production Association worked out a design and put together a testing stand for adjusting and testing the gas-cylinder equipment. Simultaneously, scientific research is going on to assess the structural characteristics and reliability of bottle-gas driven vehicles.

In the interests of safety, special copper-plated instruments also became necessary. But where to get them from, since production was not yet organized anywhere? They put together 300 sets with their own efforts. But 3 times as many more are needed.

In short, that is enough of worries and concerns which are not properly the task of automotive transport workers. Their main job, of course, is the transportation of loads. Naturally, this question arises: Wouldn't it be simpler to organize the fitting out of motor vehicles with gas apparatus directly in the plants of the Ministry of Automotive Industry? The material expenses would be less, while the technical level, of course, would be higher.

* Translator's note: In this article, "gas" refers only to compressed natural gas, not the conventional American usage, which is rendered as "gasoline" [benzin].

Meanwhile, this work is going on much too slowly. L. Pusgovalov, chief of the technical administration of the Ministry of Automotive Transport of Kazakhstan, provides the precise information that out of the 3,200 motor vehicles currently operating on compressed natural gas only every third one is fitted out directly at the motor vehicle plant. The transport workers have had to restructure the remaining ones with their own efforts.

The situation is no better with regard to developing a network of gas-filling stations, the responsibility for which lies in the Ministry of Gas Industry. It is well known that the roads in Kazakhstan are long, and on a run between cities a motor vehicle with gas cylinders cannot go the distance: there is no place to refuel en route. For that reason, vehicles running on gas stick to courses within cities and their outskirts. So much confusion is caused for the automotive transport workers, when they drive these vehicles into rural areas! They have to reequip the motors once more to run under gasoline conditions.

Attempts are being made to somehow relieve these tangles. The manufacture of portable gas fuel tanks has been studied. But without an industrial model, based only on independence and enthusiasm, little of use is resulting from it.

The drivers are experiencing still more difficulties because of the fact that the gas does not correspond to technical conditions: the concentration of moisture and mechanical impurities exceeds permissible norms by a factor of 10. In order for the fuel to meet the necessary conditions, plans call for having units for drying and purifying the gas at gas-filling stations. But, clearly, they have forgotten to install these units. Drivers are appealing to the Ministry of Gas Industry: "Help us!" From there an order was passed along to the Soyuzzbekgazprom All-Union Production Association: "Take measures!" And that is where matters rest now.

In motor vehicles with gas cylinders, questions of labor safety are more crucial. Usage regulations specify periodic and mandatory testing of the fuel systems and checking of the cylinders. This is supposed to be done at special stations. The construction of these points is also being delayed. The head institute of the RSFSR Ministry of Automotive Transport--Giproavtotrans--has for a long time been preparing the budget-planning documentation for a typical point, but the end of this work is not in sight.

In the 12th Five-Year Plan, as noted in the Basic Directions of Economic and Social Development, we face the task of significantly expanding the use of gas-cylinder motor vehicles. The automotive transport workers of Kazakhstan are, if you will, setting the tune in this important endeavor. Last year alone they saved 25,000 tons of gasoline thanks to the use of gas.

Buses recently began undergoing testing. Low-speed engines of the passenger model Ikarus use diesel fuel, while higher-speed ones use compressed gas. Automotive transport workers are also awaiting the new LAZ-695 NG buses, fitted out with apparatus for running on gas from a Lvov plant. The progress is noticeable, but the effectiveness is not as high as it might be. And the entire problem is that the efforts are still greater than the profits.

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POLYMERS AND POLYMERIZATION

UDC 678.742.2:620.18

EFFECTS OF QUINHYDRONE ON THERMOCHEMICAL CROSS-LINKING OF POLYETHYLENE

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 52, No 9, Sep 86
(manuscript received 28 May 84) pp 991-995

[Article by V. I. Myshko and A. A. Kachan, Department of Oil Chemistry,
Institute of Physicoorganic Chemistry and Carbon Chemistry, Ukrainian SSR
Academy of Sciences, Kiev]

[Abstract] An analysis was conducted on the role of quinhydrone in thermochemical cross-linking of high density polyethylene. Polymerization was found to follow from the oxidation and recombination of macroradicals formed as a result of chain destruction due to oxidation, and dehydrogenation by radicals formed by thermal decomposition of quinhydrone. With an increase in the concentration of quinhydrone the importance of radicals generated as a result of thermal decomposition at 473 K increases, while the importance of thermooxidative and destructive processes diminishes, leading to more efficient cross-linking. The presence of basic carbon in the cross-linking system enhanced the process. The OH groups of the carbon reagent functioned both to catalyze quinhydrone dissociation and to stabilize the resultant ion radicals that initiate cross-linking. The kinetics of the cross-linking process are dependent on the concentrations of quinhydrone, basic carbon and the thickness of the sample. Figures 4; references 10: 7 Russian, 3 Western.

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RADIATION CHEMISTRY

UDC 541.15

RADIOCHEMICAL YIELD OF CO₂⁻ RADICAL FROM GAMMA-IRRADIATED ALKALI AND ALKALINE EARTH METAL FORMATES

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 4, Jul-Aug 86 (manuscript received 27 Dec 85) pp 433-438

[Article by A. A. Supe, V. Ye. Zubarev and L. T. Bugayenko, Chemical Faculty, Lativan State University imeni P. Stuchka; Chemical Faculty, Moscow State University imeni Lomonosov]

[Abstract] In order to obtain a better understanding of the chemical aspects of formate radiolysis, an ESR analysis was conducted on the products produced by gamma-radiolysis of alkali and alkaline earth metal formates, as well as Zn and Cd formates, at 77 and 300 K. At room temperature the samples were irradiated at a rate of 2 kGy/h and at 77 K at a rate of 6kGy/h for a dose of 1 to 300 kGy. The spectral data demonstrated that the major product in all cases and at both temperatures was the anion radical CO₂⁻. At 300 K the radiochemical yield of CO₂⁻ was proportional to the electron fraction of the formate component in the matrix, and at 77 K to the free volume in the crystalline matrix, i.e., the cage effect was apparent. Figures 5; tables 2; references 19: 6 Russian, 1 Polish, 12 Western.

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RUBBER AND ELASTOMERS

UDC 678.19:532.135

RHEOLOGIC CHARACTERISITCS OF CELLULOSE ACETOBUTYRATE-POLYURETHANE RUBBER POLYMERIC MIXTURES

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 52, No 9, Sep 86
(manuscript received 25 Dec 84) pp 995-999

[Article by A. G. Zhigotskiy, G. K. Rashevskaya and T. M. Shvets, Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] In order to obtain a better understanding of polymeric composite materials, a study was conducted on the solubility and rheologic characteristics of cellulose acetobutyrate (120,000 MW) and polyurethane (25,000 MW) mixtures in various solvent systems (butyl acetate, methyl ethyl ketone, cyclohexanone, dioxane). Studies with cellulose acetobutyrate alone demonstrated that the characteristics of its solutions were largely predicated on polar and inductive interactions. In the case of polyurethane solutions hydrogen bonds and intermolecular interactions were of primary importance, with orientational factors leading to the formation of polymer-solvent and polymer-polymer-solvent complexes with close packing of polymer and solvent components. The rheologic parameters of 1:1 cellulose acetobutyrate and polyurethane mixtures in the different solvents indicated marked structure formation as a result of polymeric polar group interactions. In general, the flexible polyurethane blocks functioned as plasticizers of cellulose acetobutyrate macromolecular associations, leading to their increased mobility and reduction in the energy of action of viscous flow. Figures 2; references 13 (Russian).

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WOOD CHEMISTRY

PAPER INDUSTRY IN USSR

Moscow LESNAYA PROMYSHLENNOST in Russian 24 May 86 p 2

[Interview with A. N. Ustkachkintsev, first deputy minister of the chemical industry, by V. Safronov, correspondent of the Ministry of Chemical Industry Press Center: "Chief Partner"]

[Text] Reading a newspaper or journal, many people do not suspect that a wide variety of chemical compounds are used in their production. A housewife, buying sour cream in an elegant, hygienic package, naturally does not give much thought to the fact that she is holding shock-resistant polystyrene in her hands. That's life! It is difficult to calculate how many and what kind of chemical substances industry consumes. Today we will touch on problems of chemization of two of its sectors--wood processing and pulp and paper, where reagents "participate" in the production of practically every type of goods. In connection with the chemical industry's role as a supplier, our adjunct correspondent has presented a number of questions to First Deputy Minister of Chemical Industry A. N. Ustkachkintsev.

[Question] Aleksandr Nikolayevich, recently the party and government adopted an integrated program of chemization of the economy of the USSR for the period up to the year 2000. The course of accelerated development of the chemical industry itself was confirmed once more in the decisions of the 27th CPSU Congress. What sort of role will it have in strengthening other sectors?

[Answer] A highly developed, multisectorial chemical industry has developed in our country. Relying on a powerful raw materials and fuel-energy base, it produces more than 50,000 different substances--that is, practically all types of chemical goods known in the world. The chemical industry is in a position to influence and does substantially influence the development of machine building, electrical engineering, agriculture, transportation and the fuel-energy complex. With its help it is possible to sharply raise labor productivity and the effectiveness of the economy. That is why the Ministry of Chemical Industry is participating actively in fulfilling practically all integrated goal-oriented programs.

At the same time, the rates of growth and scales of production of many advanced forms of chemical goods do not fully correspond to the needs of the economy. The production of certain chemical materials with high technical and use characteristics is not being developed rapidly enough. The Integrated Program of Chemization is called upon to help eliminate the shortcomings in providing the economy with chemical goods.

It must be emphasized that this program is quite distinct from all previous programs of the same type, because of its great variety of directions, goals, and tasks, and for embracing all sectors of the economy without exception. All previous decisions touched only on the chemical industry.

Chemization of the wood-processing and pulp and paper industry will make it possible within three 5-year periods to increase the production of particle and fiberboards and plywood by 1.5 to 2 times, at the same time saving up to .5 million cubic meters of wood per year. It is planned to increase wood processing by chemical and chemical-mechanical methods up to half of the total volume.

[Question] The quality of print grades of paper largely depends on chemical additives. What specific measures has the sector planned for producing only high-quality chemicals?

[Answer] Essentially, quality is the most objective and generalized indicator of scientific and technical progress, and the level of organization of production, culture, and labor discipline. In our sector we produce many products which are not inferior to the level of quality of the world's best analogues. But we must not be content with what has already been achieved.

This year the board of directors of the ministry examined questions of radically improving it, with a goal-oriented purpose. Enterprises of the sector were given the task of developing Quality Programs. These call for bringing the main product up to the highest category, taking into account scientific-research and experimental-design projects, financing, and equipment available. Based on these programs, subsectorial programs and a sectorial Quality Program will be created, which should be completed as early as this fall. I am sure that fulfillment of this program will be noticeably reflected in the level of all goods produced.

[Question] What would you say is the reason for the unstable supplies of dyes? The pulp and paper industry is in a fever about their frequent replacement in paper production. Without having had time to work out one new technique, the paper makers are forced to adopt another one. What should be done to regulate the supplies?

[Answer] The selection of synthetic dyes for paper, as a rule, remains stable over the course of a 5-year period. It is reexamined at the beginning of each 5-year period and confirmed by two ministries--the USSR Ministry of Timber, Wood-processing, and Pulp and Paper Industry, and the Ministry of Chemical Industry.

During the 11th Five-Year Plan, six brands were removed from the Catalogue of Dyes in connection with our curtailing the production of goods manufactured from carcinogenic raw materials--benzidine. A second reason is that the enterprises of Moscow have ceased to produce a number of brands of dyes.

But the selection of these products planned for manufacture in the 12th Five-Year Plan is filled with new brands which possess improved consumer properties. They include four brands of blue colors, for which a sharp scarcity was earlier felt. The prospective selection of dyes for 1986-1990 includes chemicals of purple, blue, and green colors, intended especially for manufacturing paper.

The delay in deliveries of some brands of dyes is connected with the failure to fulfill the plan for their production. The fault for this lies primarily with the collective of Perm Chemical Plant, which disrupted the plan to produce brands such as the dye basic purple K and basic bright green--oxalate. The chemical workers have resolved to make up for their debt in the course of this year.

[Question] One of the basic directions of economizing on timber resources in the pulp and paper industry should be to reduce the amount of pulp used in the paper-making stock. But this is being held back by the shortage of flocculants. When will they be available?

[Answer] Actually, at the end of 1978 a decree of the party and government entrusted the Ministry of Chemical Industry, in particular, with organizing the production of the flocculant polyethylenimine. But because of the high toxicity of one of the intermediate products in the manufacture of the flocculant, the high prime cost of polyethylenimine itself (1 ton costs 6,000 rubles), and other reasons, production of the flocculant was not set up in the 11th Five-Year Plan.

We are rushing to develop a technique for obtaining a new flocculant--Epaflak-2. According to preliminary estimates, the economic effect from using it in the production of paper and cardboard will total approximately 6 million rubles per year.

We are currently studying the question of creating an experimental-industrial production facility of Epaflak-2 with a capacity of 500 tons per year in the Kaustik Association in Sterlitamak. This would partially satisfy the need of the pulp and paper industry and make it possible to carry out extensive industrial tests of the new flocculant in order to meet the demand for it more precisely.

[Question] The mail received by the editorial office of LESNAYA PROMYSHLENNOST shows that specialists in the wood processing and pulp and paper industry are not provided with complete information on the new developments of the chemists, the work of their enterprises, or their possibilities. What should be done to improve the contacts between the sectors?

[Answer] Our connections with the Ministry of Timber, Wood Processing, and Pulp and Paper Industry are strong and longstanding. There is a great deal of experience of interaction. At a time when there was not enough formalin to

produce plywood, we placed deliveries of it to the USSR Ministry of Timber, Wood Processing, and Pulp and Paper Industry under strict control. And gradually things shifted away from the dead point. Today we have applied this experience to deliveries of sodium sulfate, soda ash, and caustic soda for the pulp and paper industry. Of course, this was now at a different, higher level of organization. We developed an electronic system of tracking uniform shipments of these products to enterprises of the USSR Ministry of Timber, Wood Processing, and Pulp and Paper Industry. Now if there is any delay, even a not very significant one, we can effectively correct the situation. You see the results before you. There are no interruptions in the deliveries of these materials.

We have traditions of meeting with the leadership of the Ministry of Timber, Wood-Processing and Pulp and Paper Industry. Thus, in January of this year a meeting was held at the level of deputy ministers, concerning the question of providing the Ministry of Timber, Wood Processing, and Pulp and Paper Industry with chemical materials.

In addition, there is a coordinated plan to manufacture paint and varnish materials.

This year, joint projects were begun by three sectors--the USSR Ministry of Chemical Industry, Ministry of Timber, Wood Processing and Pulp and Paper Industry, and Ministry of Light Industry--to use leaf pulp in producing viscose fabrics.

As you can see, the ties between us are very close and wide-ranging. If it becomes necessary, we will expand our contacts.

As for exhaustive information on the new developments of chemical workers, the work of our enterprises is completely reflected in our sectorial journals. Subscribe to them, read them.

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